Instructor Information

- Sophia Rodriguez
- Email: sophiarodriguez@nyu.edu
- Website: https://sophiarodriguez.me
- Twitter: SophiaR305 #NYUWagnerDataViz
- Office Hours: By appointment.

Course Information

- Class Meeting Dates: 9/3 – 10/22 (Tuesdays)
- Class Meeting Times: 6:45 – 8:25 PM
- Class Location: 60FA Room C12

Course Prerequisites

- Introduction to Statistics

Course Description

In our increasingly data-reliant and data-saturated society, people who understand how to leverage data to generate insights have the power to change the world. Data visualization and storytelling is a crucial skill for policy and data analysts, communications and marketing professionals, and managers and decision-makers within nonprofits, social organizations and the government. With the advent of visualization tools that do not require coding, data storytelling is also an attainable skillset for people with varying levels of technical ability.

This hands-on introductory course will teach students how to develop meaningful data stories that reveal visual insights accessible for relevant audiences. Students will learn how to utilize Tableau, the industry standard in data visualization tools, to make sense of and visualize publicly available data. Students will leave the course with a portfolio of data visualization projects that demonstrate the application of data storytelling in their preferred context.
Course and Learning Objectives

By the end of the course, students should be able to:

1. Identify best practices in data visualization and storytelling to communicate accessible and meaningful insights.
2. Critique data visualizations and become better consumers of data.
3. Develop confidence in their ability to create and present data visualizations, gaining experience with the iterative process of data storytelling.
4. Collaborate with a team to leverage data insights and produce a collective data visualization.
5. Gain experience with Tableau.

Learning Assessment Table

<table>
<thead>
<tr>
<th>Graded Assignment</th>
<th>Course Objective Covered</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participation</td>
<td>All</td>
</tr>
<tr>
<td>Lab Sessions</td>
<td>#1, #3 and #5</td>
</tr>
<tr>
<td>Data Viz Critique</td>
<td>#1 and #2</td>
</tr>
<tr>
<td>Team Viz Project</td>
<td>#3 and #4</td>
</tr>
<tr>
<td>Final Viz Project</td>
<td>#3 and #5</td>
</tr>
</tbody>
</table>

Class Policies

This is a fast-paced, hands-on course with a lot of material condensed into seven weeks. Students should be mindful of the following expectations to ensure that they are benefitting from the sessions and achieving intended learning objectives:

- Attendance for the entire class session for all seven sessions is mandatory. Students should not register for the class if they anticipate any conflicts.
- Active engagement during the sessions is essential. Students will maximize class learning if they come prepared having completed their assigned reading and training materials and are ready to engage during the course discussions and labs.
- Deeper engagement with the content outside of the class sessions will be needed to ensure students are able to complete assignments and projects successfully. Due to the condensed nature of the course, students will need to put in additional time outside of class sessions and should plan accordingly.
Course Components

Readings/Tableau Trainings
This course is designed to be a largely practice-based course. Therefore, it is crucial to come prepared to class with the basic knowledge and theory needed to have interactive discussions and a hands-on lab. See Detailed Course Overview for more information for each week.

A majority of the required readings will come from one practical book that will introduce students to data storytelling using Tableau. The assigned book for the course – Visual Data Storytelling with Tableau by Lindy Ryan – can be purchased online or accessed via Bobst Library Course Reserve (you can borrow for 4 hours at a time). Students must read assigned chapters before coming to the respective session.

There will also be supplementary readings from noteworthy blogs on data visualization and a few academic articles. All supplementary materials are available online via hyperlinks on this syllabus or the NYU Classes folder.

There will be periodic Tableau trainings assigned to students that must be completed before coming to the respective session. All trainings can be accessed via the Tableau training website for free or via LinkedIn Learning available to the NYU community.

Orienting Lectures/Discussions
Most course sessions will begin with a brief orienting lecture and discussion to recap best practices and lessons on data visualization and storytelling. Each lecture/discussion will build on the assigned reading material for that week and should be an opportunity to deepen knowledge and clarify questions.

Lab Sessions
Most course sessions will include an experiential lab session. Students will work individually or in small teams to apply their data visualization and storytelling learning through a real-world data set and exercises. To ensure successful lab session participation, students are required to:

- Bring a fully charged laptop to each class.
- Ensure they have downloaded a Tableau Desktop license on their laptop (students are eligible for a free one-year license)
- Ensure they have Microsoft Excel on their laptop
- Ensure they download the session’s dataset before class (see Detailed Course Overview for more information).

Assignments
Students need to complete two individual assignments: one after week 1 that assesses their understanding of Tableau fundamentals and one after week 2 that allows students to exercise their newly developed data viz critique skills. Both assignments are low-stakes and intended to help students understand data viz tools and best practices. Details on each assignment will be provided in the previous class session.
Projects
Unlike the low-stakes assignments, projects are intended to assess mastery over data viz content and skills. Evaluation information can be found under Assessment Assignments and Evaluation. Projects will be uploaded via the blog tool on NYU Classes.

(1) Team Data Viz Project
Students will pick teams of 3-4 with complementary skill sets (e.g., data analysis, project management, graphic design, writing, presentation) to produce a collective data visualization and an accompanying blog post that briefly contextualizes the data viz. Teams have two options for their data viz:
- Developing an analog “data postcard” by collecting and hand drawing data they collect as a team (see the Dear Data project for more information/ideas). This project option is intended to reinforce the importance of communicating data insights effectively and creatively irrespective of the medium/tool. As students will not be using Tableau, students should be especially mindful about the visualization execution (best practices on chart types, color schemes, legends, so on). You will still be expected to submit your data analysis in Excel in addition to your analog data viz.
- Developing a data viz that improves upon an existing visualization. This project leverages the Makeover Monday challenge to reinforce the application of data viz critiquing into generating a more accessible, actionable data story. While students are encouraged to use Tableau, the team project may be completed using Excel or other viz tools.

(2) Individual Final Project
All students must create a data story using Tableau that demonstrates their data visualization and storytelling skills through the course. While students are given free reign on content and execution, all data stories must contain three visualizations using Tableau Story Points. Data stories must also serve one of two goals: to help the intended audience make data-driven decisions or to convey meaningful impact information to an intended audience. An accompanying blog post should briefly contextualize the data story and explain how it achieves one of the two intended goals.

To ensure that students are on track with their final project, the following completion deliverables will be enforced:
- Tuesday, October 1: By this class, post project topic, link to the dataset and 2-sentence overview on NYU Classes.
- Tuesday, October 1: Come to class with storyboard of project (we will do a storyboarding workshop during the class session).
- Tuesday, October 8: Come to class with a rough Tableau workbook of your final project (we will hold a working session during class).
Assessment Assignments and Evaluation

Participation (15%):
Students are required to attend all class sessions and come prepared for and actively participate in discussion and lab sessions. Please contact the instructor if any issues arise during the semester. All students will begin with the full 15 points. If students miss class or are unprepared for a class session, a maximum of 3 points will be deducted each session.

Homework Assignments (20%):
Assignment #1 is worth 5% of the course grade and Assignments #2 is worth 15% of the course grade. Assignment 1 will be a pass/fail based on completion and Assignment 2 will be graded on a 100-point scale based on completeness, effort and timeliness. Assignment 1 will be checked in the following class for completion. Assignment 2 must be submitted via NYU Classes by the beginning of class. Late assignments will have 10 points deducted for every day it is late (even if submitted same day but after class, 10 points will be deducted).

Team Project (25%):
The team project will be evaluated on three components: the data viz (90%), the orienting blog post (5%), and the team presentation (5%). The data viz evaluation rubric can be found on pages 6-7. The blog post and presentation should explain the data story in a compelling, clear and effective manner (pass/fail component based on completion). Be sure to share your data file in addition to the viz.

Teams will have 5 minutes to present their data story to the class with a 3-minute Q&A.

All team members will receive the same grade unless any issues of inequitable contributions arise. The instructor should be contacted with any concerns.

Final Project (40%):
The final project will be evaluated on two components: the data viz (90%) and the orienting blog post (10%). The data viz evaluation rubric can be found on pages 6-7. The blog post should explain the data story in a compelling, clear and effective manner (pass/fail component based on completion). Be sure to embed your data into the viz.

Extra Credit (5%):
For extra credit toward the final class grade, up to 10 students can volunteer to present their final project during the last course session. Spots will be reserved on a first-come, first-served basis and must be secured by emailing the instructor by October 15.
## GRADING RUBRIC (Adapted from Tableau for Teaching Resource)

<table>
<thead>
<tr>
<th>Criteria</th>
<th>10 – Outstanding</th>
<th>9 – Proficient</th>
<th>8 – Basic</th>
<th>7 (or lower) - Below Expectations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>OBJECTIVE</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Completed assignment per requirements</td>
<td>All portions of the assignment, including data preparation, visualization and blog post were attempted and submitted. This is a pass / fail component. All or no points are awarded.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Data is appropriate and sufficient for the analysis</td>
<td>The data set chosen or used by is appropriate, correct, and sufficient to support the thesis of the analysis.</td>
<td>Data is appropriate but minor data issues may be present or enhancements may be needed for a proper analysis.</td>
<td>Data is related but not sufficient to support the analysis, or significant data issues prevent a clear reading of the results.</td>
<td>Data has little or no relation to the topic being explored, errors will lead to incorrect conclusion, and/or data issues make the analysis unusable.</td>
</tr>
<tr>
<td>Headers, directions, citations, and visual cues are given as guides</td>
<td>Clear direction is provided. Visual cues, tooltips, and citations are consistently and correctly employed to inform and guide.</td>
<td>Header, footers, and instructions are present, but visual cues may be missing or could be improved.</td>
<td>The user must self-discover functionality. Headers and footers may be missing. Difficult to know what to do.</td>
<td>The user has little or no indication of how to engage. Directions are missing on clear. Missing headers and footers for context and meaning.</td>
</tr>
<tr>
<td>Basic visualization rules and best practices are consistently applied and demonstrated</td>
<td>Chart types are suitable and best options for the analysis. All axes and text are treated appropriately. The application of color is correct and clearly conveys meaning.</td>
<td>Chart types chosen are acceptable, but axes may be cluttered or have rotated text. Color choices communicate meaning but can be improved.</td>
<td>Charts incorrectly used for the purpose intended. Axes are difficult to read and detract from understanding. Color used in a distracting or unsuitable manner.</td>
<td>Difficult to understand what is intended with the chart and data. Color actively distracts and confuses. Chart junk dominates the visualization and the meaning is unreadable.</td>
</tr>
<tr>
<td>The visualization allows the user to conduct the intended analysis</td>
<td>The visualization facilitates quick cognition and leading to a fact-based conclusion or assertion.</td>
<td>Study is required to interpret the data and how it applies to the thesis of the analysis.</td>
<td>The visualization does not directly address the topic or relies on presentation support.</td>
<td>The visualization is completely inappropriate and cannot be used to conduct the intended analysis.</td>
</tr>
<tr>
<td><strong>SUBJECTIVE</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Viz is clean, clear, concise, captivating (Shaffer 4 C’s)</td>
<td>The 4Cs are well represented; the visualization is clear, clean, concise, and captivating.</td>
<td>Aspects of the 4Cs are apparent; opportunity exists for further enhancement.</td>
<td>Multiple aspects of the 4Cs are missing, or have not been well addressed in the visualization.</td>
<td>Significant or complete disregard for the guidance present in the 4Cs, resulting in a poor visualization.</td>
</tr>
<tr>
<td>Attractiveness and attention to design and details of craft</td>
<td>Fonts choices are conscious and consistent, proper grammar and spelling is used, and choice of position, size, and emphasis integrate elements into a visually appealing and engaging whole.</td>
<td>Visualization shows thought and planning, and most aspects work in harmony. May exhibit minor issues with spelling, alignment, or sizing mismatched with importance.</td>
<td>Visualization appears sloppy and may be difficult to understand as a coherent whole. Multiple issues with spelling, font consistency, positioning, or other distracting characteristics.</td>
<td>Little or no apparent thought or given and visualization comes across as disorganized. May be visible through numerous spelling or grammar issues, poor alignment and positioning choices inappropriate font use, etc.</td>
</tr>
<tr>
<td>The visualization is usable and actionable</td>
<td>The visualization is targeted to the audience, the story is evident, and the conclusion or action required is clearly apparent. No additional interpretation is needed.</td>
<td>There is a clear message or story conveyed, but the action or conclusion that should be drawn is not definitive. May require interpretation.</td>
<td>The visualization suggests some possibilities, but does not lead to clarity of understanding and therefore action is not possible.</td>
<td>No apparent message or relevancy to the user; no actions can nor should be taken based on the analysis.</td>
</tr>
<tr>
<td>Quality, integrity, and impact of the</td>
<td>The analysis shows a level of quality, integrity, and competency that makes</td>
<td>The overall conclusions of the analysis seem to be sound, with support</td>
<td>The analysis shows a trend or suggests a result, but is not trustworthy because of</td>
<td>The analysis appears to be poorly conducted, greatly compromising the</td>
</tr>
</tbody>
</table>
findings and analysis the viz impactful, generating a high level of trust. by anecdotes or additional evidence. errors in process, omission, or scope. integrity of some or all of the visualization.

Overall effectiveness of communication and presentation The visualization (or presentation) is delivered in a convincing way that demonstrates confidence, competency, and thoroughness. Delivery provides a strong argument and is well supported; minor details should be vetted and affirmed. The presentation and communication leaves concerns or lingering lack of clarity. Work required to review and confirm. The communication and presentation results in confusion and low level of confidence in the analysis, requiring a significant or complete re-do.

Letter Grades
Letter grades for the entire course will be assigned as follows:

<table>
<thead>
<tr>
<th>Letter Grade</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>4.0 points</td>
</tr>
<tr>
<td>A-</td>
<td>3.7 points</td>
</tr>
<tr>
<td>B+</td>
<td>3.3 points</td>
</tr>
<tr>
<td>B</td>
<td>3.0 points</td>
</tr>
<tr>
<td>B-</td>
<td>2.7 points</td>
</tr>
<tr>
<td>C+</td>
<td>2.3 points</td>
</tr>
<tr>
<td>C</td>
<td>2.0 points</td>
</tr>
<tr>
<td>C-</td>
<td>1.7 points</td>
</tr>
<tr>
<td>F</td>
<td>0.0 points</td>
</tr>
</tbody>
</table>
Student grades will be assigned according to the following criteria:

- **(A) Excellent**: Exceptional work for a graduate student. Work at this level is unusually thorough, well-reasoned, creative, methodologically sophisticated, and well written. Work is of exceptional, professional quality.

- **(A-) Very good**: Very strong work for a graduate student. Work at this level shows signs of creativity, is thorough and well-reasoned, indicates strong understanding of appropriate methodological or analytical approaches, and meets professional standards.

- **(B+) Good**: Sound work for a graduate student; well-reasoned and thorough, methodologically sound. This is the graduate student grade that indicates the student has fully accomplished the basic objectives of the course.

- **(B) Adequate**: Competent work for a graduate student even though some weaknesses are evident. Demonstrates competency in the key course objectives but shows some indication that understanding of some important issues is less than complete. Methodological or analytical approaches used are adequate but student has not been thorough or has shown other weaknesses or limitations.

- **(B-) Borderline**: Weak work for a graduate student; meets the minimal expectations for a graduate student in the course. Understanding of salient issues is somewhat incomplete. Methodological or analytical work performed in the course is minimally adequate. Overall performance, if consistent in graduate courses, would not suffice to sustain graduate status in "good standing."

- **(C/-/+ Deficient**: Inadequate work for a graduate student; does not meet the minimal expectations for a graduate student in the course. Work is inadequately developed or flawed by numerous errors and misunderstanding of important issues. Methodological or analytical work performed is weak and fails to demonstrate knowledge or technical competence expected of graduate students.

- **(F) Fail**: Work fails to meet even minimal expectations for course credit for a graduate student. Performance has been consistently weak in methodology and understanding, with serious limits in many areas. Weaknesses or limits are pervasive.
Overview of the Semester

- **Week 1**
  - Date: September 3
  - Topics:
    - The case for data visualization and storytelling
    - History and development of data viz best practices/techniques
    - Introduction to Tableau (Lab Session)

- **Week 2**
  - Date: September 10
  - Topics:
    - Data visualization and storytelling details and best practices
    - The what, why and how of critiquing data stories
    - Data prep and choosing the right visuals in Tableau (Lab Session)
  - Deliverable: Bring a completed data viz from 9/3 lab lesson to 9/10 class (Assignment 1)

- **Week 3**
  - Date: September 17
  - Topics:
    - Data ethics and integrity
    - Introduction to maps, calculated fields and dashboarding in Tableau (Lab Session)
  - Deliverables: Upload a data viz critique blog post using Junk Chart’s Trifecta Check Up by 9/17 class (Assignment 2); Select team project topic and members by 9/17

- **Week 4**
  - Date: September 24
  - Topics:
    - Team presentations
    - Data storytelling in real world applications
  - Deliverables: Completed team projects by 9/24

- **Week 5**
  - Date: October 1
  - Topics:
    - Final Projects Storyboarding Workshop
    - Advanced dashboarding in Tableau (Lab Session)
  - Deliverable: Post final project topic, data set, and 2 sentence overview by 10/1; Bring final project storyboard idea to 10/1 class
Week 6
  • Date: October 8
  • Topics:
    ▪ Introduction to data viz tools beyond Tableau
    ▪ Tableau Q&A, Final projects working session (Lab Session)
  • Deliverable: Bring final project Tableau workbook to 10/8 class

Week 7
  • Date: October 15
    ▪ No Class (NYU Operating on Monday Schedule) – Work on final project

Week 8
  • Date: October 22
    ▪ Course key takeaways and reflections
    ▪ Final project presentations (From student volunteers)
  • Final projects due by 10/22
Detailed Course Overview

WEEK 1

Readings Due
1. Lindy Ryan, *Visual Data Storytelling*, Chapters 1, 2, 3, and 7
2. Brent Dykes, "Data Storytelling: The Essential Data Science Skill Everyone Needs"

Tableau Trainings Due
- Getting Started video [25 minutes]. We will review parts of this together during Lab 1 in class.

Lab Session
- Global Superstore.xlsx [NYU Classes]
- Data Prep – Flights.xlsx [NYU Classes]
- Student Handout [NYU Classes]

WEEK 2

Readings Due
1. Lindy Ryan, *Visual Data Storytelling*, Chapters 4, 5, and 6
3. Schaffer 4 C’s of Data Visualization [NYU Classes]
4. Shaffer 4C - Clean Examples [NYU Classes]
6. Hardin et al. (Tableau), “Which chart or graph is right for you?” (Skim) [NYU Classes]
7. Visit Dear-Data.com, Dear-Data-Two.com and MakeoverMonday.co.uk [In preparation for selecting team project]

Tableau Trainings Due
- Managing Extracts [4 minutes]
- Data Prep with Text and Excel Files [5 minutes]
- Getting Started with Visual Analytics [6 minutes]

Lab Session
- Global Superstore.xlsx [NYU Classes]
- In-Class Exercise [NYU Classes]
WEEK 3

Readings Due

Tableau Trainings Due
- Using the Filter Shelf [7 minutes]
- Interactive Filters [4 minutes]
- Getting Started with Calculations [3 minutes]
- Calculation Syntax [4 minutes]

Lab Session
- Global Superstore.xlsx [NYU Classes]
- Data Prep – Flights.xlsx [NYU Classes]
- In-Class Exercise [NYU Classes]

WEEK 4

Readings Due
1. Come prepared to discuss following examples of data storytelling in the real world:
   - Canva, *“How nonprofits design their data reports”*
   - Tableau Foundation Living Annual Report
   - Krochet Kids Intl. Women of Uganda Program Impact Dashboard
   - Health Intelligence, *“A global overview of the magnitude, disparities and trend of infant mortality in the world.”*
   - SAP’s Future of Work Report [NYU Classes]

Tableau Trainings Due
- N/A – work on team projects!

Lab Session
- N/A
WEEK 5

Readings Due
1. Lindy Ryan, *Visual Data Storytelling*, Chapter 8
2. Cole Nussbaum, “#SWDChallenge: sticky notes”

Tableau Trainings Due
- Creating Interactive Dashboards in Tableau 10 [LinkedIn Learning course available to NYU community]. Focus on following modules: Worksheet Design, Dashboard Design and Designing Interactivity

Lab Session
- Airbnb Listings.xlsx [NYU Classes]

WEEK 6

Readings Due
1. Lindy Ryan, *Visual Data Storytelling*, Chapter 9

Tableau Trainings Due
- N/A – work on final projects!

Lab Session
- Bring your own Tableau workbooks

WEEK 7
- No Class (NYU Operating on Monday Schedule) – Work on final project

WEEK 8

Readings Due
1. Lindy Ryan, *Visual Data Storytelling*, Chapter 10

Tableau Trainings Due
- N/A – work on final projects!

Lab Session
- N/A
Student Resources

NYU Data Services has an entire collection of resources on Tableau as well as offers in-person consultations for NYU students. There is also a great mini-workshop tutorial on Data Storytelling in Tableau offered by Fanalytics 2018, a community event organized during Tableau Conference (download Tableau workbook and follow along). Also, NYU students have free access to LinkedIn Learning (through NYU Home) which offers a warehouse of online talks and data courses on data visualization.

There are countless blogs on data visualization online that can serve as helpful references. Here are a few to get started:

- http://www.storytellingwithdata.com/ by Cole Nussbaumer
- https://flowingdata.com/ by Nathan Yau
- https://informationisbeautiful.net/ by David McCandless
- https://policyviz.com/ (Check out the podcast) by Jonathan Schwabish
- https://www.economist.com/node/21011894 by The Economist
- https://datatherapy.org/about/ by Rahul Bhargava

Select data sources that can potentially be used for final project:

- https://community.tableau.com/docs/DOC-10635
- https://www.gapminder.org/data/
- https://opendata.cityofnewyork.us/data/
- https://www.census.gov/data.html
- https://www.data.gov/

Supplementary Resources

- Edward Segel and Jeffrey Heer, “Narrative Visualization: Telling Stories with Data”
- Tableau Webinar, “How to Design Engaging Data Stories in Tableau: 7 Starter Story Types”
- Dashboarding Inspiration, http://everydaydashboards.com/
NYU Classes and Course Communication

This is a living syllabus and may change throughout the semester. All changes will be communicated via announcements through NYU Classes. Students should ensure they are receiving notification emails when new announcements are posted.

Lectures slides and completed lab files will be uploaded after each class in NYU Classes under Resources → respective week.

Students should feel free to email me with any questions and expect a response within 48 hours. Students should be mindful that this is not my full-time job; responses during business hours will likely be limited.

Academic Integrity

Academic integrity is a vital component of Wagner and NYU. All students enrolled in this class are required to read and abide by Wagner's Academic Code. All Wagner students have already read and signed the Wagner Academic Oath. Plagiarism of any form will not be tolerated and students in this class are expected to report violations to me. If any student in this class is unsure about what is expected of you and how to abide by the academic code, you should consult with me.

Henry and Lucy Moses Center for Students with Disabilities at NYU

Academic accommodations are available for students with disabilities. Please visit the Moses Center for Students with Disabilities (CSD) website and click on the Reasonable Accommodations and How to Register tab or call or email CSD at (212-998-4980 or mosescsd@nyu.edu) for information. Students who are requesting academic accommodations are strongly advised to reach out to the Moses Center as early as possible in the semester for assistance.

NYU’s Calendar Policy on Religious Holidays

NYU’s Calendar Policy on Religious Holidays states that members of any religious group may, without penalty, absent themselves from classes when required in compliance with their religious obligations. Please notify me in advance of religious holidays that might coincide with exams to schedule mutually acceptable alternatives.